PATENT SPECIFICATION

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COMPLETE SPECIFICATION

Improvements relating to Gear Changing Mechanism

(Communicated by BENDIX AVIATION CORPORATION.)

We, BENDIX AVIATION CORPORATION, of 105, West Adams Street, Chicago, Illinois, United States of America, a corporation organised under the laws of the State of Delaware, United States of America, and FREDERICK JOHN CLEVELAND, Chartered Patent Agent, of 29, Southampton Buildings, Chancery Lane, London, W.C.2, a British Subject, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention has for an object to provide improvements in gear changing mechanism for automotive vehicles and of the kind in which a single manually operated control member mounted on the dash of the vehicle adjacent the driver's seat serves to control a source of power which is utilised to effect the operation of the transmission, and in which the arrangement is such that the transmission can be operated manually by the same manual control in the event of power failure.

According to the invention, a gear change control for an automotive vehicle having in combination a change speed transmission including a plurality of shifter bars, a selector member mounted for reciprocating movement to selectively engage said bars, power means including a pressure responsive element connected to the selector member for shifting the latter and shifter bar engaged thereby, valve means for controlling the energisation of the power means, a manually operable control member mounted on a supporting member for movement in two perpendicular planes, and mechanical means including a longitudinally movable member for connecting said selector member and manual control member for controlling the shifter bar engaging movement of the selector member in accordance with movement of the manual control member in one of said two planes, is characterised in that other mechanical means separate from said first mechanical means connects the valve means and manual control member to control the valve means in accordance with movement of the manual control member in the other of said two planes. The mechanical means may each comprise a Bowden cable device, and the valve which is in the connection between the control member and the pressure responsive element may include parts connected by lost motion connection and respectively connected with the second Bowden control device and the said pressure responsive element whereby, in the event of power failure, movement of the control member in said other of said two planes will take up the lost motion connection and effect manual shifting movement of the selector member.

Other objects of the invention and desirable details of construction and combinations of parts will become apparent from the following description of the preferred embodiment, which description is taken in conjunction with the accompanying drawings, in which:

Figure 1 is a diagrammatic view of the transmission operating mechanism constituting the invention;

Figure 2 is a longitudinal sectional view of the pressure differential operated motor adapted to operate one or the other of the shift rails of the transmission;

Figure 3 is a front view of the manually operated selector constituting one of the principal elements of the invention;

Figure 4 is a sectional view of the selector mechanism, taken on the line 4—4 of Figure 1; and

Figure 5 is a view disclosing, in section, part of a standard three-speeds forward and reverse transmission and a portion of the transmission operating means constituting the invention.

Referring now to figure 1, disclosing a preferred embodiment of the invention, the numeral 10 indicates a standard three-speeds forward and reverse transmission of conventional design. As disclosed in figure 5, the first and reverse gear shift rail 12 of the transmission and its juxtaposed high and second gear shift rail (not shown) are selectively operated by

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a crank 14 provided with a ball-shaped end member 16, adapted to fit within the oppositely disposed slots 18 in the rails. The crank 14 extends from a tubular member 20 sleeved over a pin 22 rotatably mounted in the casing 24 of the transmission. The member 20 is provided with a recessed portion into which fits a yoke member 26, the latter being secured at its lower end to a pin 28 journaled at 30 and 32 in the casing 24. Upon rotating the pin 28 by means of a crank 34, the yoke 26 serves to slide the tubular member 20 to nest the ball-shaped end member 16 into engagement with one or the other of the shift rails. This operation corresponds to the so-called cross-shift operation of the conventional manually operated cross-shift lever, when the same is operated to select one or the other of the shift rails prior to meshing the gears.

One of the important features of the invention is in the means for operating the above-described rail selecting means. As disclosed in figure 1 and shown in detail in figure 4, there is provided a so-called selector 36, comprising a tubular housing member 38 adjustably secured to the engine side of the dashboard 40. From a tubular plunger 42, slidably mounted within the member 38, there projects a pin 44 adapted to fit within an H-shaped slot in the member 38. The plunger 42 is rotated by means of a hand operated knob 46 secured to the plunger by means of a rectangular-shaped pin 48. Upon rotating the knob counter-clockwise so that a pointer 50 thereon is moved to the first and reverse gear position indicated by the numeral L and the letter R, figure 3, a crank 52, figure 4, serves to move a cable 54 of a Bowden control 56 to rotate the crank 34 and nest the ball 16 in the first and reverse gear shift rail 12. It follows that clockwise rotation of the knob 46 serves to nest the ball 16 in the second and high gear shift rail preparatory to establishing the transmission in either second or high gear.

Describing now the mechanism for moving the rails to shift the gears, having selected a shift rail to be moved, the knob 46 is either pushed in or pulled out to slide the pin 44 within one or the other of channels 58 and 60 of the H-slot in the member 38. Describing the low gear shift, movement of the knob toward the driver serves, through the intermediary of a Bowden control 62 comprising a conduit 64 and a cable 66, to move to the left a plunger 68 with which the cable 66 is connected. The plunger 68 has an annular projection 70 which, as the plunger moves to the left, unseats a spring-loaded valve member 72 and seats a valve member 74. The plunger member 68 is, with the valve parts in the position disclosed in Figure 2, that is with the transmission in neutral, urged into contact with the hub 76 of a piston 78. The left compartment 80 of a double-acting air suspended pressure differential operated motor 82, including a cylinder 84 and the aforementioned piston 78, is consequently evacuated by virtue of a connection with the intake manifold 86 of the car via a conduit 88, a duct 90 in the plunger 68, a duct 92 in the projection 70, and a port 94 in the hub 76.

As is well known in this art, when the throttle 96 is closed by release of an accelerator 98, the engine pistons function to partially evacuate the manifold, thus providing a source of vacuum to energize the transmission operating motor 82. As the left compartment 80 is evacuated, as above described, the air within the right compartment 100 of the motor, at atmospheric pressure, creates a pressure differential to move the piston 78 to the left and move the rail 12, the rail and piston being interconnected by means of a hollow connecting rod 102 and a crank 104. The transmission is thus established in low gear. As is disclosed in Figure 2, compartments 80 and 100 are normally vented to the atmosphere via a port 106, the spacing 108 between the hollow connecting rod 102 and a sleeve 110, the port 94 in the hub 76 of the piston 78, a port 112 in the sleeve 110, an annular groove 114 in the plunger 68, a duct 116 in said plunger, and a port 118 in the hub 76. Valvular members 74 and 120 are normally unseated, that is, as disclosed in Figure 2, they do not abut the seats on the hub 76 when the transmission is in neutral and the piston is in its intermediate position. It will be noted that should the knob 46 be held momentarily in a partially extended position during the operation of placing the transmission in low gear, the hub 76 of the piston will move to the left under the load of the atmosphere to again seat the valve 72, the parts again being in the position disclosed in figure 2. This is known as a lapped position of the valve mechanism, the action constituting what is known in the art as a follow-up valve action.

The above-described valve cracking operation may, of course, be repeated until the transmission is completely meshed in low gear.

Pushing the knob toward the dash serves to establish the transmission in reverse gear, assuming that the knob has been rotated to place the pin 44 in the channel 60. In this operation, a spring

loaded valve 122 is unseated and the spring loaded valve member 72 is seated, resulting in the right compartment 100 of the motor 82 being evacuated. As will be obvious in figure 2 and from the previous description the compartment 80 is at the time vented to atmosphere, resulting in the piston 78 being subject to a differential of pressure to move the same to the right and thereby establish the transmission in reverse gear. The follow-up to-lap action of the valve mechanism is the same as previously described.

It will be obvious that the above-described operation of the motor and its valve mechanism will be duplicated in placing the transmission in either second or high gear, when the knob is rotated to place the pin 44 in the channel 58. A repetition of the description of the motor operation is accordingly believed to be unnecessary.

It will be noted that in the event of the failure of the power means the transmission may be operated solely by the physical effort of the driver: furthermore, with the above-described mechanism, the transmission may be operated concurrently by the power means and by the physical effort of the driver. Describing this action, when the valve members 72, 74, 120 and 122 and adjacent springs 124 and 126 go solid with the projection 70 and abutments 128 and 130, there is provided means for moving the rod 102 to the left or right to place the transmission in gear by the physical effort of the driver. For example, in placing the transmission either in low gear or in high gear, the cable within the conduit 64, plunger 68, projection 70, valve members 72 and 74, and spring member 124 become a solid connection, thus forming a lost motion connection cooperating with the hub 76, connecting rod 102 and crank 104, to actuate the transmission by the physical effort of the driver. If at the time the compartment 80 is evacuated, then this physical effort is supplemented by the load from the motor.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A gear change control for an automotive vehicle having in combination a change speed transmission including a plurality of shifter bars, a selector member mounted for reciprocating movement to selectively engage said bars, power means including a pressure responsive element connected to the selector member for shifting the latter and shifter bar engaged thereby, valve means for controlling the energisation of the power means, a manually operable control member mounted on a supporting member for movement in two perpendicular planes, and mechanical means including a longitudinally movable member for connecting said selector member and manual control member for controlling the shifter bar engaging movement of the selector member in accordance with movement of the manual control member in one of said two planes, wherein other mechanical means separate from said first mechanical means connects the valve means and manual control member to control the valve means in accordance with movement of the manual control member in the other of said two planes.

2. A gear change control for an automotive vehicle having in combination a change speed transmission including a plurality of shifter bars movable longitudinally to establish different gear relations, a selector member mounted for reciprocating movement in one plane to select a desired shifter bar and movable in another plane to shift the selected bar, power means including a pressure responsive element connected to the selector member for imparting shifting movements thereto, a single manually operable control member mounted on a supporting member for movement in one plane for bar selecting and for movement in a perpendicular plane for bar shifting, a mechanical force transmitting means including a longitudinally movable member for connecting the selector member and control member for effecting selecting movement of the selector member in accordance with movement of the control member in said one plane, and a movable valve member for controlling the energisation of the power means, wherein a second mechanical force transmitting means separate from said first transmitting means connects said valve member and control member for effecting operation of the former and consequent energisation of the power means in accordance with movement of the control member in said perpendicular plane, and means remote from the control member connects said second transmitting means and the pressure responsive element for manually moving the latter and the selector member connected thereto in the event of power failure.

3. A gear change control for an automotive vehicle having in combination a change speed transmission including a plurality of spaced shifter bars movable longitudinally to establish different gear relations, a selector member mounted for reciprocating movement in one plane to

select a desired shifter bar and movable in another plane to shift the selected shifter bar, power means including a pressure responsive element connected to the selector member for imparting shifting movements thereto, a single manually operable control member mounted on a supporting member for movement in one plane for bar selecting and for movement in a perpendicular plane for bar shifting, and a Bowden cable device connecting said selector member and control member for effecting selecting movement of the selector member in accordance with movement of the control member in said one plane, wherein a second Bowden cable device separate from said first Bowden cable device connects the control member and the pressure responsive element through the intermediary of valve means for controlling the energisation of the power means in accordance with movement of the control member in said perpendicular plane, said valve means including parts connected by a lost motion connection and respectively connected with the second Bowden control device and the pressure responsive element whereby, in the event of power failure, movement of the control member in said perpendicular plane will take up said lost motion connection and effect manual shifting movement of the selector member.

4. A gear change control for an automotive vehicle, substantially as shown in the accompanying drawings, and described with reference thereto.

Dated this 5th day of April, 1939.

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Fig. 1

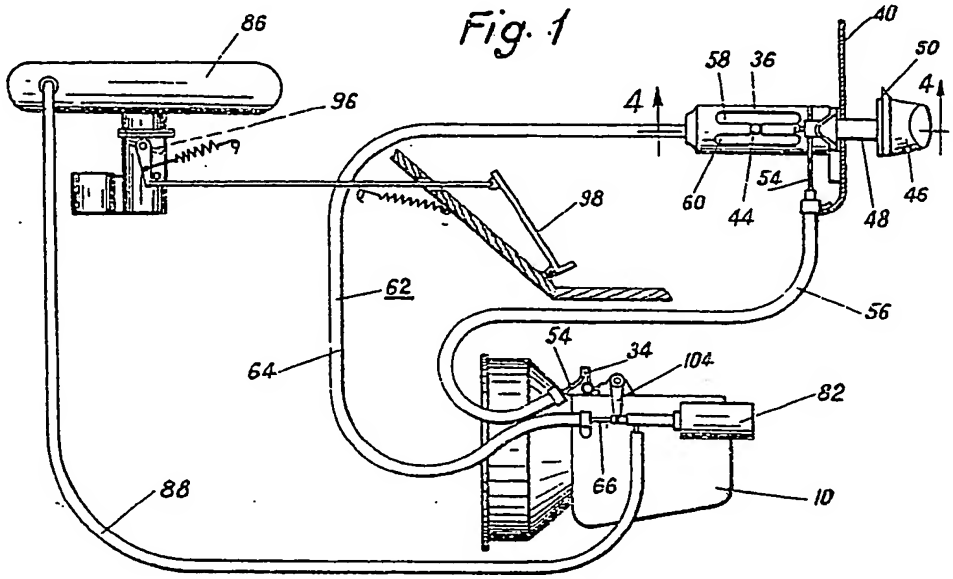


Fig. 2

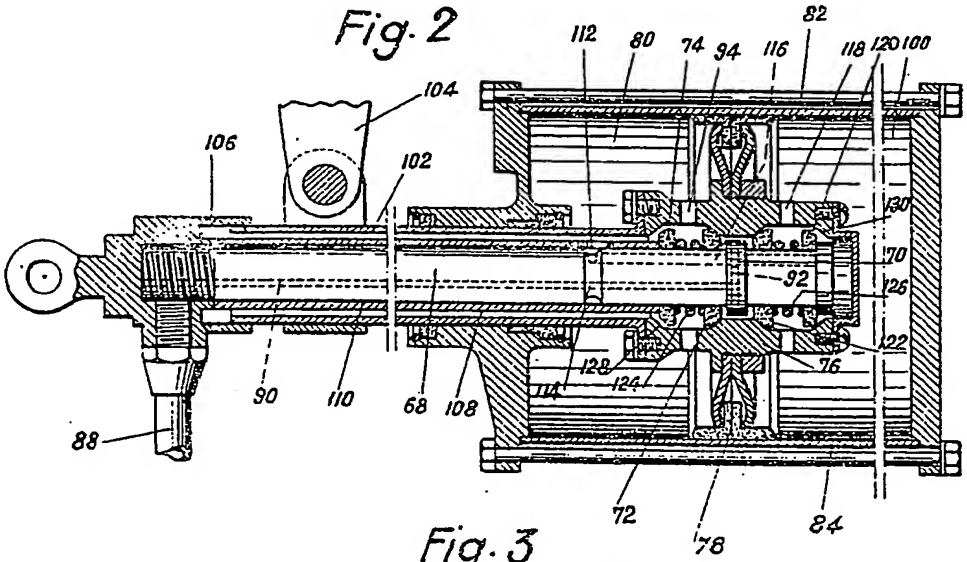
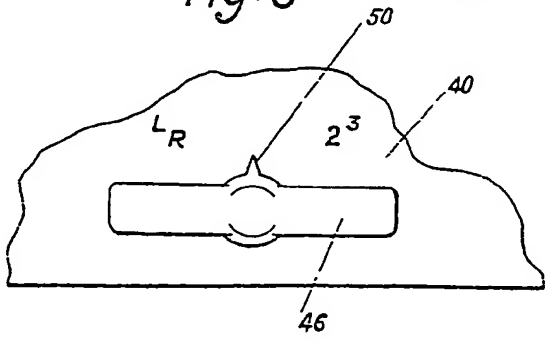


Fig. 3



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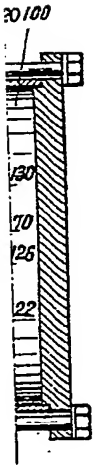

Fig. 4

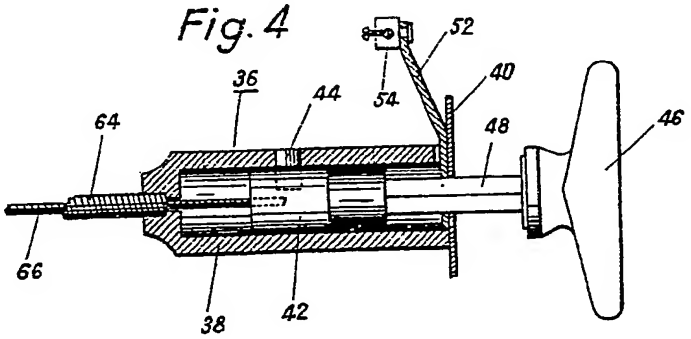

Fig. 5

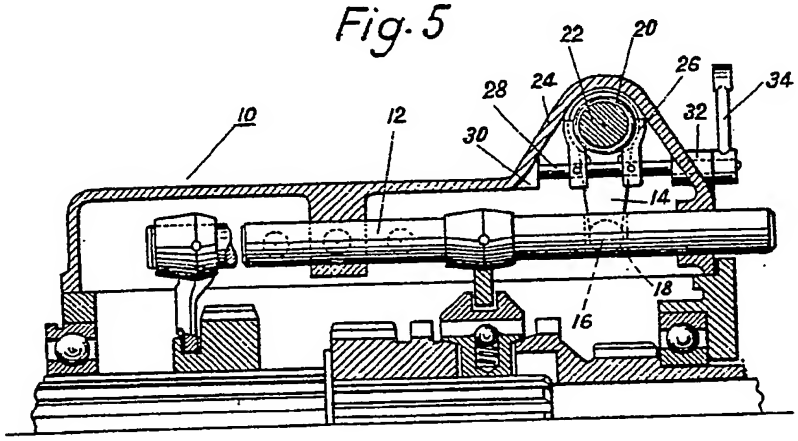

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Fig. 1

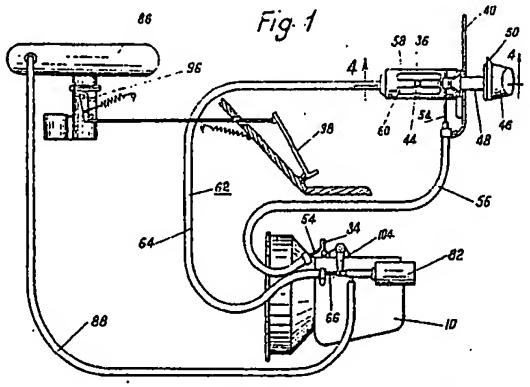


Fig. 2

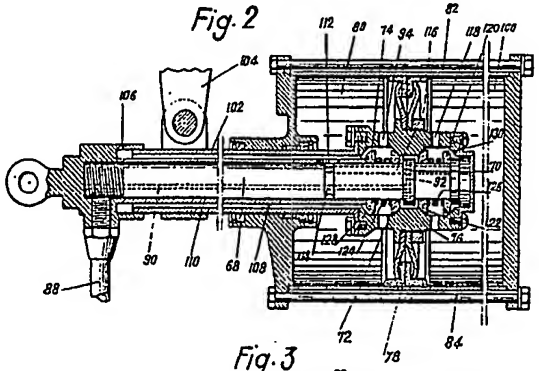


Fig. 3

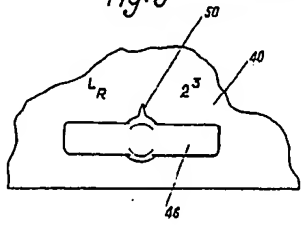


Fig. 4

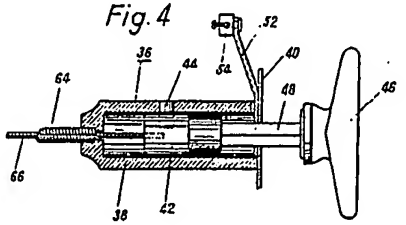
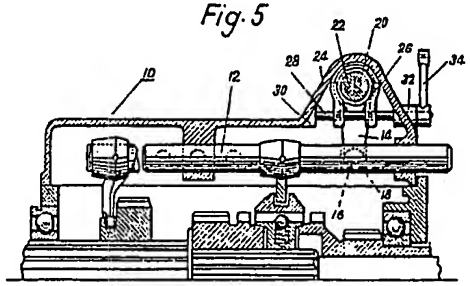


Fig. 5



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